

## CLAIMS

What is claimed is:

1. A metal plate material hot molding apparatus, wherein

in a metal plate material hot molding apparatus for press molding a heated metal plate material, supply piping for a cooling medium is provided in a mold, ejection holes for the cooling medium are provided in a molding surface of the mold, and the supply piping and the ejection holes communicate with each other.

2. The metal plate material hot molding apparatus according to claim 1, wherein the ejection holes for the cooling medium have a diameter between 100  $\mu\text{m}$  and 10 mm and a pitch between 100  $\mu\text{m}$  and 1000 mm.

3. The metal plate material hot molding apparatus according to claim 1, wherein discharge piping for the cooling medium is provided in the mold, discharge holes for the cooling medium are provided in the molding surface of the mold, and the discharge piping and the discharge holes communicate with each other.

4. The metal plate material hot molding apparatus according to claim 3, wherein the discharge holes for the cooling medium have a diameter between 100  $\mu\text{m}$  and 10 mm and a pitch between 100  $\mu\text{m}$  and 1000 mm.

5. The metal plate material hot molding apparatus according to claim 1, wherein at least part of the mold is formed of porous metal having plural holes.

6. The metal plate material hot molding apparatus according to claim 1, wherein cooling piping is provided in the mold.

7. The metal plate material hot molding apparatus according to claim 1, wherein a valve mechanism is provided in the ejection hole.

8. The metal plate material hot molding apparatus according to claim 1, wherein a sealing mechanism which prevents the cooling medium from flowing out is provided at a periphery of the mold.

9. The metal plate material hot molding apparatus according to claim 1, wherein plural projections having an area ratio between 1% and 90%, a diameter or circumcircle diameter between 10  $\mu\text{m}$  and 5 mm, and a height between 5  $\mu\text{m}$  and 1 mm are provided on at least part of the molding surface of the mold.

10. The metal plate material hot molding apparatus according to claim 9, wherein the projection is a NiW-plated layer or chrome-plated layer with a thickness between 10  $\mu\text{m}$  and 80  $\mu\text{m}$ .

11. The metal plate material hot molding apparatus according to claim 1, wherein the ejection hole for the cooling medium is provided only in a portion where a heat transfer coefficient between the metal plate material and the mold is 2000  $\text{W/m}^2\text{K}$  or less.

12. A metal plate material hot molding method, wherein

in a metal plate hot molding method of press

molding a heated metal plate material using the metal plate material hot molding apparatus according to any one of claims 1 to 11, molding is performed while a cooling medium is ejected to a gap between the metal plate material and a mold from ejection holes.

13. The metal plate material hot molding method according to claim 12, wherein the cooling medium ejected to the gap between the metal plate material and the mold is discharged from the ejection holes and/or discharge holes.

14. The metal plate material hot molding method according to claim 12, wherein the cooling medium is ejected only to a portion where a heat transfer coefficient calculated by measuring temperatures of the metal plate material and the mold is  $2000 \text{ W/m}^2\text{K}$  or less.

15. The metal plate material hot molding method according to claim 12, wherein the cooling medium is one kind or two kinds or more of water, a polyhydric alcohol, a polyhydric alcohol solution, polyglycol, a mineral oil with a flash point of  $120^\circ\text{C}$  or higher, synthetic ester, a silicon oil, a fluorine oil, grease with a dropping point of  $120^\circ\text{C}$  or higher, and a water emulsion obtained by mixing a surfactant into a mineral oil or synthetic ester.

16. The metal plate material hot molding method according to claim 12, wherein the cooling medium is ejected during holding at a press bottom dead center.